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EXAMINER

SPITTLE, MATTHEW D

ART UNIT PAPER NUMBER

2111

DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/800,454	SWEET, JIM	
	<b>Examiner</b>	<b>Art Unit</b>	
	Matthew D. Spittle	2111	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-8, 11-17, 19-24 and 27-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 34-38 is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-17, 19-24 and 27-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

Claims 1 – 8, 11 – 17, 19 – 24, and 27 – 38 have been examined.

#### ***Claim Rejections - 35 USC § 103***

5           The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

10           (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15           The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.     Determining the scope and contents of the prior art.
2.     Ascertaining the differences between the prior art and the claims at issue.
3.     Resolving the level of ordinary skill in the pertinent art.
- 20    4.     Considering objective evidence present in the application indicating obviousness or nonobviousness.

          Claims 1, 2, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Baker et al.

25           With regard to claim 1, Davis et al. teach a method for sharing hardware resources in a digital system, the method comprising:

          Determining whether a hardware resource (paragraph 21 describes a semaphore being mapped to a memory, data store, embedded processor) is in use by monitoring contents of at least one of a plurality of semaphore registers (Figure 4 shows the process of a thread attempting to lock a resource. In the case where the thread wins

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30 arbitration, but finds the semaphore already locked, it may return back to the round robin selection (start, item 100, item 110, item 120, item 130, item 150, item 170). Examiner interprets this as the thread monitoring the contents of semaphore registers "Sem\_Val" and "Sem\_Lock").

Davis et al. fail to teach accessing said monitored contents of said plurality of  
35 semaphore registers by using a limited-width test bus whose bus width contains less than a number of bits needed to individually address each of said plurality of semaphore registers.

Baker et al. teach a limited-width test bus whose bus width contains less than a number of bits needed to individually address all of the address space (column 2, lines  
40 59 – 63).

It would have been obvious to one of ordinary skill in this art at the time of invention by applicant to incorporate the limited-width test bus as taught by Baker et al. into the method of Davis et al. for the purpose of reducing the number of pins needed for the bus. This would have been obvious since Baker et al. teach that reducing the  
45 number of pins required for the bus would reduce the cost of the system and increase the reliability (column 1, lines 23 – 45).

With regard to claim 2, Baker et al. teach the additional limitation of assigning a portion of said limited-width test bus to address each of said plurality of semaphore  
50 registers (where a semaphore register may be interpreted as a memory device; column 3, lines 11 – 14, 24 – 27) and assigning a remaining portion of said limited-width test

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bus to address each register bit location in said plurality of semaphore registers (column 3, lines 11 – 14, 43 – 47).

55           With regard to claim 11, Davis et al. teach the additional limitation of a method according to claim 1 further comprising determining from said monitored contents of said plurality of semaphore registers an identifier of a software thread using said hardware resource (paragraph 25).

60           With regard to claim 12, Davis et al. teach the additional limitation of a method according to claim 11, further comprising tracking said software thread that is using said hardware resource (paragraph 25; Examiner interprets storing the thread identifier in a semaphore register as tracking the software thread, i.e., maintaining knowledge of what hardware resources it is using).

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\*       \*       \*

Claims 13 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Baker et al., and further in view of Ando et al.

70           With regard to claim 13, Davis et al. teach a plurality of semaphore registers (paragraph 25; Figure 3), but fail to teach arranging the registers into register blocks, and selecting one of said plurality of semaphore register blocks to be accessed by a limited-width test bus for monitoring contents in said selected one of said plurality of

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semaphore registers (Figure 4 shows the process of a thread attempting to lock a  
75 resource. In the case where the thread wins arbitration, but finds the semaphore  
already locked, it may return back to the round robin selection (start, item 100, item 110,  
item 120, item 130, item 150, item 170). Examiner interprets this as the thread  
monitoring the contents of semaphore registers "Sem\_Val" and "Sem\_Lock").

Baker et al. teach a limited-width test bus ((column 2, lines 59 – 63).

80 Ando et al. teach arranging a plurality of registers into register blocks (Figure 1,  
items 20<sub>1</sub> to 20<sub>4</sub>), and selecting one of said plurality of registers to be accessed by a bus  
(bus: Figure 1, item 1; selection: column 4, lines 9 – 12, 17 – 26; column 6, lines 6 – 9,  
17 – 20)

It would have been obvious to one of ordinary skill in this art at the time of  
85 invention by applicant to incorporate the limited-width test bus as taught by Baker et al.  
into the method of Davis et al. for the purpose of reducing the number of pins needed  
for the bus. This would have been obvious since Baker et al. teach that reducing the  
number of pins required for the bus would reduce the cost of the system and increase  
the reliability (column 1, lines 23 – 45).

90 It would have been obvious to one of ordinary skill in this art at the time of  
invention by applicant to organize the semaphore registers as taught by Davis et al. into  
register blocks as taught by Ando et al. This would have been obvious in order to  
simplify the decoding circuit and reduce the number of signal lines required to access  
the registers (column 7, lines 9 – 24).

With regard to claim 14, Baker et al. teach the additional limitation of assigning at least one bit line in the bus to select one of said plurality of semaphore register blocks (where a memory device may be interpreted as a register block; column 3, lines 24 – 27).

100

With regard to claim 15, Baker et al. teach the additional limitation of assigning a portion of said limited-width test bus to address each of said plurality of semaphore registers (where a semaphore register may be interpreted as a memory device; column 3, lines 11 – 14, 24 – 27) and assigning a remaining portion of said limited-width test bus to address each register bit location in said plurality of semaphore registers (column 3, lines 11 – 14, 43 – 47).

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\* \* \*

Claims 19, 20, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Baker et al.

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With regard to claim 19, Davis et al. teach a system for sharing hardware resources in a digital system, the system comprising:

A plurality of hardware resources (paragraph 21 describes a semaphore being mapped to a memory, data store, embedded processor – Examiner interprets these as hardware resources);

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A plurality of semaphore registers coupled to said plurality of hardware resources (paragraph 21 describes a semaphore being mapped to a memory, data store, embedded processor);

120        Davis et al. fail to teach a limited-width test bus coupled to said plurality of semaphore registers, wherein said limited-width test bus contains less than a number of bits needed to individually address each of said plurality of semaphore registers.

125        Baker et al. teach a limited-width test bus whose bus width contains less than a number of bits needed to individually address all of the address space (column 2, lines 59 – 63).

130        It would have been obvious to one of ordinary skill in this art at the time of invention by applicant to incorporate the limited-width test bus as taught by Baker et al. into the method of Davis et al. for the purpose of reducing the number of pins needed for the bus. This would have been obvious since Baker et al. teach that reducing the number of pins required for the bus would reduce the cost of the system and increase the reliability (column 1, lines 23 – 45).

135        With regard to claim 20, Baker et al. teach the additional limitation of assigning a portion of said limited-width test bus to address each of said plurality of semaphore registers (where a semaphore register may be interpreted as a memory device; column 3, lines 11 – 14, 24 – 27) and assigning a remaining portion of said limited-width test bus to address each register bit location in said plurality of semaphore registers (column 3, lines 11 – 14, 43 – 47).



140           With regard to claim 27, Davis et al. teach the additional limitation of a system  
according to claim 19, wherein a processor coupled to said limited-width test bus (where  
a processor may be interpreted as a semaphore coprocessor; paragraph 18)  
determines an identifier of a software thread that is using one of said hardware  
resources based on contents of at least one of said plurality of semaphore registers  
145 (where an identifier may be interpreted as a thread ID; paragraph 25).

          With regard to claim 28, Davis et al. teach the additional limitation of a method  
according to claim 27, wherein said processor tracks said software thread that is using  
said hardware resource (paragraph 25; Examiner interprets storing the thread identifier  
150 in a semaphore register as tracking the software thread, i.e., maintaining knowledge of  
what hardware resources it is using).

\* \* \*

155           Claims 29 – 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over  
Davis et al. in view of Baker et al., and further in view of Ando et al.

          With regard to claim 29, Davis et al. teach a plurality of semaphore registers, but  
fail to teach the registers organized in blocks, a selector coupled to said plurality of  
semaphore register blocks that enables monitoring contents in said plurality of register  
160 blocks (Figure 4 shows the process of a thread attempting to lock a resource. In the

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case where the thread wins arbitration, but finds the semaphore already locked, it may return back to the round robin selection (start, item 100, item 110, item 120, item 130, item 150, item 170). Examiner interprets this as the thread monitoring the contents of semaphore registers "Sem\_Val" and "Sem\_Lock"), and a limited-width test bus

165 connected to said plurality of semaphore registers blocks of said selector.

Ando et al. teach a plurality of register blocks comprising a plurality of registers (Figure 1, items 20<sub>1</sub> to 20<sub>4</sub>), and a selector coupled to said plurality of semaphore register blocks (where a selector may be interpreted as a decoder; Figure 1, item 27; column 4, lines 9 – 12, 17 – 26; column 6, lines 6 – 9, 17 – 20).

170 Baker et al. teach a limited-width test bus (column 2, lines 59 – 63).

It would have been obvious to one of ordinary skill in this art at the time of invention by applicant to organize the semaphore registers as taught by Davis et al. into register blocks as taught by Ando et al. This would have been obvious in order to simplify the decoding circuit and reduce the number of signal lines required to access  
175 the registers (column 7, lines 9 – 24).

It would have been obvious to one of ordinary skill in this art at the time of invention by applicant to incorporate the limited-width test bus as taught by Baker et al. into the method of Davis et al. for the purpose of reducing the number of pins needed for the bus. This would have been obvious since Baker et al. teach that reducing the  
180 number of pins required for the bus would reduce the cost of the system and increase the reliability (column 1, lines 23 – 45).

With regard to claim 30, Baker et al. teach the additional limitation of assigning at least one bit line in the bus to select one of said plurality of semaphore register blocks (where a memory device may be interpreted as a register block; column 3, lines 24 – 27).

With regard to claim 31, Davis et al. teach the additional limitation wherein a processor (where a processor may be interpreted as a semaphore coprocessor; paragraph 18) determines whether a hardware resource is in use in said selected one of said plurality of semaphore register blocks (paragraphs 23, 25).

With regard to claim 32, Davis et al. teach the additional limitation of a system further comprising determining from said monitored contents of said plurality of semaphore registers an identifier of a software thread using said hardware resource (paragraph 25).

With regard to claim 33, Davis et al. teach the additional limitation of a system, further comprising tracking said software thread that is using said hardware resource (paragraph 25; Examiner interprets storing the thread identifier in a semaphore register as tracking the software thread, i.e., maintaining knowledge of what hardware resources it is using).

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Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Baker et al. and Flynn et al.

Regarding claim 3, Davis et al., and Baker et al., fail to teach where said  
210 determination of whether said hardware resource is in use further comprises ORing each register bit location in each of said plurality of semaphore registers if a protocol reset state is logic 0.

Flynn et al. teach determination of whether a hardware resource is in use comprises ANDing each register bit location (Figure 6; column 15, line 57 – column 16,  
215 line 5; in each of said plurality of semaphore registers (Examiner interprets the resources available vector as a plurality of semaphore registers since each vector contains bits in registers which mark whether or not a resource is being used; column 7, lines 47 – 53; column 14, line 55 – column 15, line 7) if a protocol reset state is logic 0 (where a protocol reset state is interpreted as a logic state of the semaphore register  
220 value; Examiner notes that this determination is made regardless of the logic states of the register values, and therefore meets this limitation).

Flynn et al. fail to explicitly teach ORing, however, Balch teaches that OR and AND gates are readily interchangeable by using inverters (e.g., a NOT gate) through the use of DeMorgan's Law (page 8). DeMorgan's law is old and well known in this art, and  
225 therefore, Examiner takes official notice that it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to apply it to use OR gates with inverting gates and achieve the same functionality as with using the AND gates of

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Flynn et al. Additionally, Flynn et al. hints that other implementations would be apparent to those skilled in the art (column 16, lines 59 – 66).

230 It would have been obvious to one of ordinary skill in this art at the time of  
invention by applicant to combine the method of Flynn et al. with the method of Davis et  
al. and Baker et al. for the purpose of providing a means of arbitrating access to shared  
resources. This would have been obvious since Flynn et al. teach that their method  
makes efficient use of all system resources at the time they are available, and  
235 guarantees requests for resources to be honored within a reasonable time so that a  
requesting unit is never locked out (column 3, line 58 – column 4, line 3; column 18,  
lines 46 – 48, 56 – 59).

Regarding claim 5, Flynn et al. teach the additional limitation further comprising  
240 addressing each one of said plurality of semaphore registers by coupling at least one  
OR gate utilized for said ORing to a bit line in said limited-width test bus (Figure 6, item  
172 shows a bit line coupled to AND gate 172; As discussed in the rejection of claim 3,  
AND gates may be implemented from OR gates, and therefore meets this limitation.  
Examiner broadly interprets a limited width test bus as a bus of fixed width.).

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\* \* \*

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et  
al. in view of Baker et al., Flynn et al., and what is well known in this art as evidenced by

250 Anderson (U.S. 5,590,159), Liao et al. (U.S. 6,421,312), and Dunlop et al. (U.S. 6,259,326).

Regarding claim 4, Flynn et al. fails to explicitly teach the limitation where if a result of said determination logic is logic 1, then said hardware resource is in use; and if result of said determination is logic 0, then said hardware resource is not in use.

255 Rather, Flynn et al. teach when the result of determination is logic 1, then said hardware resource is not in use, and if result of said determination is logic 0, then said hardware resource is in use (column 15, line 66 – column 16, line 5). Examiner takes official notice that it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to invert the output of the determination logic of Flynn et al. to  
260 achieve this result by using an inverter (e.g., a NOT gate). This is evidenced in Anderson (U.S. 5,590,159) in column 5, lines 9 – 22), Liao et al. (U.S. 6,421,312) in column 5, lines 53 – 59), and Dunlop et al. (U.S. 6,259,326) in column 7, lines 52 – 57).

\* \* \*

265 Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Baker et al., and Flynn et al.

Regarding claim 6, Davis et al., and Baker et al., fail to teach where said determination of whether said hardware resource is in use further comprises ANDing  
270 each register bit location in each of said plurality of semaphore registers if a protocol reset state is logic 1.

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Flynn et al. teach determination of whether a hardware resource is in use comprises ANDing each register bit location (Figure 6; column 15, line 57 – column 16, line 5; in each of said plurality of semaphore registers (Examiner interprets the resources available vector as a plurality of semaphore registers since each vector contains bits in registers which mark whether or not a resource is being used; column 7, lines 47 – 53; column 14, line 55 – column 15, line 7) if a protocol reset state is logic 0 (where a protocol reset state is interpreted as a logic state of the semaphore register value; Examiner notes that this determination is made regardless of the logic states of the register values, and therefore meets this limitation).

It would have been obvious to one of ordinary skill in this art at the time of invention by applicant to combine the method of Flynn et al. with the method of Davis et al. and Baker et al. for the purpose of providing a means of arbitrating access to shared resources. This would have been obvious since Flynn et al. teach that their method makes efficient use of all system resources at the time they are available, and guarantees requests for resources to be honored within a reasonable time so that a requesting unit is never locked out (column 3, line 58 – column 4, line 3; column 18, lines 46 – 48, 56 – 59).

Regarding claim 8, Flynn et al. teach the additional limitation further comprising addressing each one of said plurality of semaphore registers by coupling at least one AND gate utilized for said ANDing to a bit line in said limited-width test bus (Figure 6,

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item 172 shows a bit line coupled to AND gate 172; Examiner broadly interprets a limited width test bus as a bus of fixed width.).

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Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Baker et al., Flynn et al., and what is well known in this art as evidenced by  
300 Anderson (U.S. 5,590,159), Liao et al. (U.S. 6,421,312), and Dunlop et al. (U.S. 6,259,326).

Regarding claim 7, Flynn et al. teach the additional limitation where if the result of determination is logic 1, then said hardware resource is not in use, and if result of said determination is logic 0, then said hardware resource is in use (column 15, line 66 –  
305 column 16, line 5). Examiner takes official notice that it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to invert the output of the determination logic of Flynn et al. to achieve this result by using an inverter (e.g., a NOT gate). This is evidenced in Anderson (U.S. 5,590,159) in column 5, lines 9 – 22), Liao et al. (U.S. 6,421,312) in column 5, lines 53 – 59), and Dunlop et al. (U.S.  
310 6,259,326) in column 7, lines 52 – 57).

\* \* \*



Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Baker et al., and further in view of Flynn et al.

Regarding claim 16, Davis et al., and Baker et al., fail to teach where said determination of whether said hardware resource is in use further comprises ORing each register bit location in each of said plurality of semaphore registers if a protocol reset state is logic 0.

Flynn et al. teach determination of whether a hardware resource is in use comprises ANDing each register bit location (Figure 6; column 15, line 57 – column 16, line 5; in each of said plurality of semaphore registers (Examiner interprets the resources available vector as a plurality of semaphore registers since each vector contains bits in registers which mark whether or not a resource is being used; column 7, lines 47 – 53; column 14, line 55 – column 15, line 7) if a protocol reset state is logic 0 (where a protocol reset state is interpreted as a logic state of the semaphore register value; Examiner notes that this determination is made regardless of the logic states of the register values, and therefore meets this limitation).

Flynn et al. fail to explicitly teach ORing, however, Balch teaches that OR and AND gates are readily interchangeable by using inverters (e.g., a NOT gate) through the use of DeMorgan's Law (page 8). DeMorgan's law is old and well known in this art, and therefore, Examiner takes official notice that it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to apply it to use OR gates with inverting gates and achieve the same functionality as with using the AND gates of

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335 Flynn et al. Additionally, Flynn et al. hints that other implementations would be apparent to those skilled in the art (column 16, lines 59 – 66).

It would have been obvious to one of ordinary skill in this art at the time of invention by applicant to combine the method of Flynn et al. with the method of Davis et al. and Baker et al. for the purpose of providing a means of arbitrating access to shared  
340 resources. This would have been obvious since Flynn et al. teach that their method makes efficient use of all system resources at the time they are available, and guarantees requests for resources to be honored within a reasonable time so that a requesting unit is never locked out (column 3, line 58 – column 4, line 3; column 18, lines 46 – 48, 56 – 59).

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Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al. in view of Baker et al., and further in view of Flynn et al.

350 Regarding claim 17, Davis et al., and Baker et al., fail to teach where said determination of whether said hardware resource is in use further comprises ANDing each register bit location in each of said plurality of semaphore registers if a protocol reset state is logic 1.

Flynn et al. teach determination of whether a hardware resource is in use  
355 comprises ANDing each register bit location (Figure 6; column 15, line 57 – column 16, line 5; in each of said plurality of semaphore registers (Examiner interprets the

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resources available vector as a plurality of semaphore registers since each vector contains bits in registers which mark whether or not a resource is being used; column 7, lines 47 – 53; column 14, line 55 – column 15, line 7) if a protocol reset state is logic 0  
360 (where a protocol reset state is interpreted as a logic state of the semaphore register value; Examiner notes that this determination is made regardless of the logic states of the register values, and therefore meets this limitation).

It would have been obvious to one of ordinary skill in this art at the time of invention by applicant to combine the method of Flynn et al. with the method of Davis et  
365 al. and Baker et al. for the purpose of providing a means of arbitrating access to shared resources. This would have been obvious since Flynn et al. teach that their method makes efficient use of all system resources at the time they are available, and guarantees requests for resources to be honored within a reasonable time so that a requesting unit is never locked out (column 3, line 58 – column 4, line 3; column 18,  
370 lines 46 – 48, 56 – 59).

\* \* \*

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et  
375 al. in view of Baker et al., and further in view of Flynn et al.

Regarding claim 21, Davis et al., and Baker et al., fail to teach wherein each register bit in each of said plurality of semaphore registers is coupled to an OR gate.

Flynn et al. teach each register bit in each of said plurality of semaphore registers being coupled to an AND gate (Figure 6; column 15, line 57 – column 16, line 5;

380 (Examiner interprets the resources available vector as a plurality of semaphore registers since each vector contains bits in registers which mark whether or not a resource is being used; column 7, lines 47 – 53; column 14, line 55 – column 15, line 7).

Flynn et al. fail to explicitly teach ORing, however, Balch teaches that OR and AND gates are readily interchangeable by using inverters (e.g., a NOT gate) through the  
385 use of DeMorgan's Law (page 8). DeMorgan's law is old and well known in this art, and therefore, Examiner takes official notice that it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to apply it to use OR gates with inverting gates and achieve the same functionality as with using the AND gates of Flynn et al. Additionally, Flynn et al. hints that other implementations would be apparent  
390 to those skilled in the art (column 16, lines 59 – 66).

It would have been obvious to one of ordinary skill in this art at the time of invention by applicant to combine the method of Flynn et al. with the method of Davis et al. and Baker et al. for the purpose of providing a means of arbitrating access to shared resources. This would have been obvious since Flynn et al. teach that their method  
395 makes efficient use of all system resources at the time they are available, and guarantees requests for resources to be honored within a reasonable time so that a requesting unit is never locked out (column 3, line 58 – column 4, line 3; column 18, lines 46 – 48, 56 – 59).

400           Regarding claim 22, Flynn et al. teach the additional limitation further comprising  
addressing each one of said plurality of semaphore registers by coupling at least one  
OR gate utilized for said ORing to a bit line in said limited-width test bus (Figure 6, item  
172 shows a bit line coupled to AND gate 172; As discussed in the rejection of claim 3,  
AND gates may be implemented from OR gates, and therefore meets this limitation.  
405   Examiner broadly interprets a limited width test bus as a bus of fixed width.).

\*       \*       \*

          Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et  
410   al. in view of Baker et al., and further in view of Flynn et al.

          Regarding claim 23, Davis et al., and Baker et al., fail to teach wherein each  
register bit in each of said plurality of semaphore registers is coupled to an AND gate.

          Flynn et al. teach wherein each register bit in each of said plurality of semaphore  
registers is coupled to an AND gate (Figure 6; column 15, line 57 – column 16, line 5;  
415   Examiner interprets the resources available vector as a plurality of semaphore registers  
since each vector contains bits in registers which mark whether or not a resource is  
being used; column 7, lines 47 – 53; column 14, line 55 – column 15, line 7).

          It would have been obvious to one of ordinary skill in this art at the time of  
invention by applicant to combine the method of Flynn et al. with the method of Davis et  
420   al. and Baker et al. for the purpose of providing a means of arbitrating access to shared  
resources. This would have been obvious since Flynn et al. teach that their method

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makes efficient use of all system resources at the time they are available, and guarantees requests for resources to be honored within a reasonable time so that a requesting unit is never locked out (column 3, line 58 – column 4, line 3; column 18, lines 46 – 48, 56 – 59).

Regarding claim 24, Flynn et al. teach the additional limitation further comprising addressing each one of said plurality of semaphore registers by coupling at least one AND gate utilized for said ANDing to a bit line in said limited-width test bus (Figure 6, item 172 shows a bit line coupled to AND gate 172; Examiner broadly interprets a limited width test bus as a bus of fixed width.).

#### ***Allowable Subject Matter***

Claims 34 – 38 are allowed.

#### ***Response to Arguments***

Applicant's arguments filed 8/18/2006 have been fully considered but they are not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

With regard to Applicant's argument that there is no teaching, suggestion, or  
445 incentive as to why it would be obvious to selectively apply the technique for utilizing a  
communication bus that transmits fewer address bytes than an address field contains,  
Examiner notes that the invention of Davis et al. relates to accessing semaphores  
memory by processors (paragraph 7, see "Typically, all the semaphores are in the same  
system memory. Each thread/processor must arbitrate to access the memory to unlock  
450 their semaphore.")). The invention of Baker et al. pertains to an improved method of  
accessing memory by processors (column 1, lines 9 – 16, see "The invention is in the  
field of common bus communication systems, and especially systems for the  
transmission of addresses and data between the processing and memory elements of a  
data processing system." The teaching, suggestion, or incentive as to why it would be  
455 obvious to combine comes from Baker et al. in column 1, lines 23 – 45, which describe  
how using the limited-width test bus of Baker et al. reduces the cost of a system, and  
increases the reliability of the system.

Regarding Applicant's argument that the registers of Ando et al. are used for  
being the source or destination of data transfer and not for being "accessed by a limited-  
460 width test bus for monitoring contents in said selected one of said plurality of  
semaphore register blocks," Examiner agrees that the invention of Ando et al. does not  
pertain specifically to semaphores. Rather, the invention of Ando et al. is cited as  
providing incentive to group registers into register blocks, which Davis et al. and Baker  
et al. do not specifically disclose. The purpose of doing so would be to simplify the  
465 register decoding circuit and reduce the number of signal lines required to access the

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registers (column 7, lines 9 – 24). This would have been obvious in order to reduce the cost of the system, reduce the complexity, and thus make for a simpler and more reliable system.

Regarding Applicant's argument that the Flynn reference does not disclose or  
470 makes reference to the use of the AND gates for monitoring the contents of semaphore registers via a limited-width test bus, Examiner notes that Flynn discloses using registers in the "resource available vector" that have a single bit corresponding to each system resource, and possession of each resource (column 14, line 67 – column 15, line 7). This would be recognized by one of ordinary skill in this art as a semaphore – a  
475 mechanism for indicating a particular event has taken place, in this case that a resource is or isn't being used, or that a resource is or isn't reserved. Furthermore, column 15, line 57 – column 16, line 5 indicates how AND gates are used to monitor the contents of these registers and provide a meaningful output to indicate whether or not a resource is in use or reserved. Thus, Flynn does disclose monitoring the contents of semaphore  
480 registers through the use of AND gates. Examiner agrees that Flynn alone does not disclose a limited-width test bus.

Regarding Applicant's challenge to the Official Notice of claims 4 and 7, Examiner provides evidence that it would have been obvious to one of ordinary skill in this art at the time of invention by Applicant to invert logic states in a digital system.  
485 This is evidenced in Anderson (U.S. 5,590,159) in column 5, lines 9 – 22), Liao et al. (U.S. 6,421,312) in column 5, lines 53 – 59), and Dunlop et al. (U.S. 6,259,326) in column 7, lines 52 – 57).



**Conclusion**

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within  
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew D. Spittle whose telephone number is (571) 272-2467. The examiner can normally be reached on Monday - Friday, 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Rinehart can be reached on 571-272-3632. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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MDS



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